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ABSTRACT

America is no longer an industrial society but an information society made up of knowledge workers as opposed to production workers. As America accelerates into the information society and the technology it offers, Americans must view themselves as part of three worlds, each affected by society--professional, personal, and social. Significant developments that have resulted as a direct outgrowth of the information age include databases, electronic mail, automated banking, and data communications. The technologies of the future will offer instructional systems based on a combination of video and computer technologies. In the professional world, personal computers will become essential. Today, technology is inexpensive, portable, and understandable. Vocational business educators can, with the assistance of the technological age, realistically prepare students to compete in the real world. Implementing such courses or topics as automated accounting, accessing large databases, ergonomics, word processing, and electronic merging and filing will have an impact upon all students' lives. Findings from educational research regarding computers show that computer labs are gaining in educational popularity, commercially prepared educational software is the most pedagogically sound, and personal computer use is increasing dramatically in homes, schools, and businesses. (YLB)

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NEW ORLEANS LA

"THE QUEST FOR TEACHING/LEARNING EXCELLENCE IN A TECHNOLOGICAL AGE"

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SUNDAY

DECEMBER 2, 1984

NEW ORLEANS SHERATON

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"THE QUEST FOR TEACHING/LEARNING EXCELLENCE IN A TECHNOLOGICAL AGE"

YOU AS VOCATIONAL BUSINESS EDUCATORS ARE IN A UNIQUE POSITION TODAY.

WITH THE MID-POINT OF THE 1980'S CLEARLY WITHIN VIEW, BUSINESS EDUCATORS ARE BEING CONFRONTED WITH TEACHING AND LEARNING CHALLENGES NEVER BEFORE FACED. POSITIVE FEEDBACK PRESENTLY SURFACING INDICATES THAT THE INFORMATION REVOLUTION IS HAVING PROFOUND EFFECTS ON BOTH TEACHING AND LEARNING STRATEGIES. AS VOCATIONAL EDUCATORS TODAY, YOU HAVE ACCEPTED THE CHARGE OF PREPARING OUR STUDENTS TO SUCCESSFULLY COMPETE IN THE TECHNOLOGICAL-JOB ERA. FORTUNATELY, YOU AS COMPETENT VOCATIONAL EDUCATORS CAN PREPARE STUDENTS FOR TODAY'S COMPLEX JOB MARKET BY EFFECTIVELY UTILIZING STATE-OF-THE-ART TECHNOLOGIES.

THE YEAR IS 1977. THE LOCATION IS NORTHERN CA. IN A GEOGRAPHICAL AREA NOW AFFECTIONATELY REFERRED TO AS THE SILICON VALLEY. THE PLACE--IN A GARAGE. ACTUALLY--A SMALL UNATTACHED BUILDING--IN LOS ALTOS--COMPLETE WITH WASHER, DRYER, WORK BENCH, AND A ROOM FULL OF COMPUTER SCHEMATICS.

IT IS HERE THAT PERHAPS THE MOST SIGNIFICANT TECHNOLOGICAL INNOVATION IN MODERN TIMES TOOK PLACE. THE DEVELOPMENT OF THE FIRST-GENERATION MICROCOMPUTER. AS HAS BEEN HISTORICALLY TRUE, INITIAL PUBLIC ACCEPTANCE WAS SLIGHTLY LESS THAN

ENTHUSIASTIC. EARLY MICROCOMPUTERS EXHIBITED SOME UNAPPEALING CHARACTERISTICS—

OPERATION WAS DIFFICULT

SLOW IN PROGRAM EXECUTION

COSTLY

LIMITED MEMORY

LIMITED PRODUCTIVITY

LACKED PORTABILITY

LIMITED SOFTWARE

THE BALANCE OF THIS PRESENTATION WILL DEAL WITH TECHNOLOGY —YESTERDAY, TODAY, AND TOMORROW AND THE IMPACT OF TECHNOLOGY ON TEACHING EXCELLENCE.

PERSONAL COMPUTERS--OFFER A NEW GENERATION OF MANAGEMENT TOOL. INCREASING PRODUCTIVITY IS A GERMANE TOPIC IN AMERICAN BUSINESS CIRCLES. U.S. PRODUCTIVITY HAS DECLINED STEADILY FOR 30 YEARS. THE REMAINDER OF THE DECADE OF THE 1980'S WILL FOCUS ON PRODUCTIVITY OR THE *EMERGENCE* OF THE KNOWLEDGE INDUSTRY. AMERICA IS NO LONGER AN INDUSTRIAL SOCIETY.

FOR EXAMPLE: LOWELL, MASSACHUSETTS--BIRTHPLACE OF THE FIRST MANUFACTURING FACILITY IN THE COUNTRY, A SHOE FACTORY. DO YOU KNOW WHAT IS LOCATED ON THAT SITE TODAY?? THE WORLD HEADQUARTERS OF **WANG**.

STEP BACK FOR A MOMENT--WHO WERE YOUR CHILDHOOD HEROES--BOSTON BLACKIE, HOPALONG CASSIDY, THE LONE RANGER, LAMONT CRANSTON--THEY ALWAYS HELPED PAY THE MORTGAGE FOR THE DAMSEL IN DISTRESS AND GOT THE GOLD BACK. TODAY'S HEROES

INCLUDE--JAMES BOND, HE DOESN'T DEAL IN GOLD BUT IN **MICRODOTS, LASERS, AND INFORMATION**. JOHN GLENN AND ALAN SHEPPARD TRAVELED INTO SPACE TO SECURE **INFORMATION**.

IN THE RECENTLY PUBLISHED BOOK ENTITLED "AMERICA II," AUTHORED BY RICHARD LOUV THE AUTHOR STATES, "AMERICA IS THE NATION EMERGING AS INDUSTRIAL AMERICA FADES." LOUV OFFERS AN INTROSPECTIVE OUTLOOK ON OLD ETHNIC VALUES AS RELATED TO THE NEW TECHNOLOGIES--URBAN-TO-RURAL MIGRATION, AND MANAGEMENT TECHNIQUES DESIGNED TO MAKE OUR EDUCATIONAL SYSTEMS AND COMPANIES MORE LIKE A FAMILY."

MORE AMERICANS ARE ENGAGED IN **INFORMATION-RELATED JOBS TODAY** THAN IN MANUFACTURING AND AGRICULTURE COMBINED. WE ARE AN **INFORMATION SOCIETY** MADE UP OF **KNOWLEDGE WORKERS** AS OPPOSED TO **PRODUCTION WORKERS**.

HARDWARE EVOLUTION

1940-1950'S	ENIAC
1964	15,000 COMPUTERS
1975	KIT COMPUTERS
1980	$1,000,000,000 SALES
1987 EST.	$28,000,000,000 SALES

THIS IS ALL WELL AND GOOD BUT AS VOCATIONAL EDUCATORS WE NEED TO DO MORE THAN JUST TALK ABOUT HOW GREAT IT'S GOING TO BE--WE NEED TO TAKE A **PROACTIVE** POSITION RATHER THAN A **REACTIVE** ONE.

AN OLDER MAIDEN LADY WENT TO HER DOCTOR FOR A PHYSICAL EXAM. THE DOCTOR AFTER LOOKING OVER HER CHART, NOTED THAT SHE HAD BEEN MARRIED 3 TIMES AND AT THE CONCLUSION OF THE EXAM INQUIRED AS TO WHY SHE WAS STILL A MAIDEN. SHE EXPLAINED HUSBAND #1--THEY WERE ON THEIR HONEYMOON AND HE HAD A TRAGIC AUTO ACCIDENT. HE WAS KILLED INSTANTLY AND HER RECUPERATIVE PERIOD WAS EXTENSIVE. WHILE IN THE HOSPITAL SHE DECIDED TO DEVOTE HER REMAINING YEARS TO MEDICINE BY BECOMING A NURSE. WHILE IN HER TRAINING SHE MET HUSBAND #2--A DOCTOR. THEY FELL IN LOVE, WERE MARRIED AT THE COURT HOUSE AND AS THEY WERE LEAVING HE HAD A HEART ATTACK AND DIED. NOW HUSBAND #3 IS A MICROCOMPUTER SALESMAN WHO DOES NOTHING BUT SIT ON THE EDGE OF THE BE AND TALK ABOUT HOW GOOD IT'S GONNA' BE!!

BITS, BYTES, AND BLINKING LIGHTS . . . AHHH THOSE WONDERFUL EDUCATIONAL TOYS CALLED MICROCOMPUTERS . . .

LET'S LOOK BRIEFLY AT WHAT WAS HAPPENING AT THE TIME OF THE FIRST COMPUTERS--ENIAC AND UNIVAC. DURING THIS ERA THERE WERE FEW ECONOMIES OF SCALE. THE WAR HAD JUST ENDED AND THE COUNTRY WAS *MOSTLY BLUE COLLAR WORKERS*. PRODUCTIVITY WAS HIGH AND THE COUNTRY WAS GROWING WITH A GNP 3-4% EACH YEAR IN THE 1950'S.

THEN THE GI'S RETURNED, WERE EDUCATED ON THE GI BILL AND BECAME WHITE COLLAR WORKERS AND PRODUCTIVITY STARTED FALLING. NOT BECAUSE OF THEM BUT BECAUSE OF OTHER CIRCUMSTANCES.

WHY? THE GI'S WERE WHITE COLLAR BUT THE **MONEY** FOR DEVELOPMENT OF PRODUCTIVITY TOOLS WENT TO SUPPORT OTHER JOB TYPES. BILLIONS OF $ WERE SPENT TO IMPROVE PRODUCTIVITY--ALL WITH LITTLE EFFECT.

ACCORDING TO ***NEWSWEEK***, MANAGERS' AND PROFESSIONALS' SALARIES REPRESENT 79% OF ALL $$ SPENT IN BUSINESS. 21% OF THE TOTAL GOES FOR SALARIES FOR CLERICALS. BUT WHERE WAS THE MONEY SPENT???

THINK ABOUT IT. WHAT WAS THE OFFICE PRODUCTIVITY TOOL IN 1950? IT WAS AN OFFICE AUTOMATION TOOL DEVELOPED IN 1873 BY CHRISTOPHER SHOLES AND MARKETED BY REMINGTON--**THE TYPEWRITER**. DURING THE **MID-TO LATE 1950'S** WE WERE GIVEN THE ELECTRIC TYPEWRITER; THE **1960'S** SAW **PHOTOCOPIERS** AND **DIVERSE TELEPHONE-SYSTEMS GADGETRY**. BILLIONS OF $$ WENT FOR SUPPORT OF THE 21% OF CLERICAL EMPLOYEES.

AS AMERICA ACCELERATES NONSTOP INTO THE INFORMATION SOCIETY AND THE TECHNOLOGY IT OFFERS WE MUST VIEW OURSELVES AS **PART OF THREE WORLDS**, EACH ONE IMPACTED BY SOCIETY--*PROFESSIONAL, PERSONAL, AND SOCIAL*. LET'S EXAMINE THEM IN REVERSE ORDER.

SOCIAL WORLD--PROBABLY THE MOST COMMON **COCKTAIL CONVERSATION** NOW INVOLVES **PERSONAL COMPUTERS** AND THE IMPACT THEY ARE HAVING.. **COMPUTER USER'S GROUPS** ARE NOW MORE POPULAR THAN SINGLES' CLUBS.

PERSONAL WORLD--MOST IMPACTED BY THE CHILDREN. IF MY PARENTS WERE FRUSTRATED WITH **NEW MATH** THINK OF WHAT WE FEEL WHEN

OUR CHILDREN USE AUTOMATED ASSSISTANCE. EVERY GENERATION HAS HAD TO DEAL WITH ISSUES OF PROGRESS AND CHANGE WHICH MAKES IT DIFFICULT FOR PARENTS TO RELATE TO THEIR CHILD'S EDUCATIONAL EXPERIENCE. IN THE 1950'S IT WAS SIMULTANEOUS LINEAR EQUATIONS, SET THEORY, POLYNOMIALS, ELIPSES AND PARABOLAS TODAY IT IS PASCAL, "GO TO" AND "FOR NEXT," AND FOR THOSE WHO WISH TO RELATE, HAVING A BASIC UNDERSTANDING OF THE TECHNOLOGY CAN PROVIDE THE PARENT WITH THE TOOLS TO UNDERSTAND AND ENRICH THEIR CHILD'S EDUCATIONAL EXPERIENCE.

BUT IT ISN'T JUST UNDERSTANDING THE CHILD'S WORLD WHICH MAKES THE UNDERSTANDING IMPORTANT. LIKE IT OR NOT WE HAVE TO JOIN THE PARADE.

CLOSE YOUR EYES--PAUSE--THINK BACK TO THE 1960'S. ONE OF TOFLER'S WAVES OF CHANGE WAS CAUSING EXTREME ANXIETY IN OUR SOCIETY. DO YOU REMEMBER WHEN YOUR TELEPHONE NUMBER WAS RIVERSIDE 4-5789 AND YOUR RESIDENCE WAS LOCATED AT MINNEAPOLIS12, MINNESOTA? ALL OF A SUDDEN IT WAS RI-VERSIDE 4-5789 AND WE HAD FIVE DIGIT ZIP CODES TO PUNCTUATE OUR ADDRESSES.

THE PEOPLE WHO SAY THE PERSONAL COMPUTER IS AN EXPENSIVE *HOOLA HOOP* WERE MORE THAN LIKELY THE SAME PEOPLE WHO ASKED THE OPERATOR TO GET THEM 7,445,789. THEY DID NOT WANT TO RELATE TO PROGRESS. AS SOON AS WE WERE READY TO RELATE TO SEVEN NUMBERS WE ADDED AREA CODES & THREE MORE DIGITS AND WE COULD INSTANTLY PHONE ALL OVER THE WORLD WITH NO OPERATOR ASSISTANCE. THEN FOUR ADDITIONAL DIGITS ARE ADDED TO OUR ZIP CODE--BRINGING THE TOTAL TO NINE AND NO TWO ZIPS ARE THE

SAME!!

LET'S CONSIDER SOME OF THE OTHER SIGNIFICANT DEVELOPMENTS WHICH HAVE RESULTED AS A **DIRECT OUTGROWTH OF THE INFORMATION AGE:**

DATA BASES
ELECTRONIC MAIL
AUTOMATED BANKING
DATA COMMUNICATIONS

WE ARE INDEED IN THE INFORMATION AGE AS WITNESSED BY THIS ANECDOTE--A MINISTER WAS RELATING A PERSONAL DELIMA HE WAS EXPERIENCING TO ONE OF HIS PARISHIONER'S. HE HAD DISCOVERED HIS BICYCLE HAD BEEN STOLEN. THE PARISHIONER SUGGESTED THAT PERHAPS THE MINISTER SHOULD ADDRESS THE SUBJECT IN THE FORM OF A SERMON ON THE 10 COMMANDMENTS. THE CHURCH MEMBER CONTINUED BY SUGGESTING WHEN THE MINISTER REACHED THE COMMANDMENT "THOU SHALT NOT STEAL" THAT ADDITIONAL TIME SHOULD BE DEVOTED TO THE TOPIC. THE NEXT SUNDAY HE DID AND ON MONDAY THE FELLOW APPROACHED THE PERSON-OF-THE-CLOTH. THE PARISHIONER NOTICED HE HAD HIS BIKE. "AH, PREACHER," THE CHURCH MEMBER YELLED, "I TOLD YOU, YOUR BIKE WOULD BE RETURNED." THE MINISTER EXPLAINED IT HAD NOT WORKED--BUT THAT WHEN HE HAD REACHED THE COMMANDMENT *"THOU SHALL NOT COMMIT ADULTERY"* IT OCCURRED TO HIM WHERE HIS BIKE WAS.

DATA BASES. BACK IN THE 1950'S THE DATA BASE BUSINESS BEGAN. COMPANIES SELLING INFORMATION PUBLISHED ELECTRONICALLY INSTEAD OF ON PAPER BEGAN TO OFFER SERVICES. THEN IN THE 1960'S AND 1970'S THE INFORMATION INDUSTRY GREW INTO A BILLION

DOLLAR BUSINESS WITH TODAY MORE THAN 450 DATA BASES AVAILABLE TO SUBSCRIBERS.

JOHN NAISBETT IN THE ENORMOUSLY POPULAR "FUTURES" BOOK, MEGATRENDS ADDRESSES THE ISSUE OF THE INFORMATION SOCIETY BY STATING "IF USERS--THROUGH INFORMATION UTILITIES--CAN LOCATE THE INFORMATION THEY NEED THEY WILL GLADLY PAY FOR IT. THE WHOLE INFORMATION SOCIETY SHIFTS, FROM SUPPLY TO SELECTION.

ABOUT TWO YEARS AGO THE FIRST DATA BASE RETAILER OPENED --TELECOMMUNICATIONS CORPORATION OF AMERICA. THE DATA BASE ENTITLED THE SOURCE IS A PART OF THE CORPORATION. THE SOURCE IS A COLLECTION OF DATA BASES AVAILABLE AT A LOW COST THROUGH A COMMON ACCESS CODE. THINK OF IT AS A DATA BASE GROCERY STORE--YOU CAN WALK INTO A GROCERY STORE AND PURCHASE #10 OF CRAYFISH, #2 OF COLBY CHEESE, FRUIT, A LOAF OF SOURDOUGH BREAD, AND A BOTTLE OF CHARDONNAY. NONE OF THESE PRODUCTS IS MANUFACTURED BY THE STORE BUT BUT ALL ARE FOR SALE BY THE STORE. SO IT IS WITH THE SOURCE YOU CAN ACCESS UPI, AP, WINE INFORMATION, BIORHYTHMS, AIRLINE SCHEDULES, MOVIE REVIEWS, AND A WHOLE LIST OF OTHER PIECES OF INFORMATION--ALL OF WHICH ARE OFFERED BY THEIR RESPECTIVE MANUFACTURERS FOR SALE THROUGH THE SOURCE.

THE SOURCE OFFERED SOMETHING UNIQUE. IT ALLOWED A PERSON TO TRANSMIT AS WELL AS RECEIVE INFORMATION. PRIOR TO THIS, DATA BASE SYSTEMS HAD BEEN ONE-DIRECTIONAL. THIS IS THE FIRST TIME YOU COULD TALK BACK. BUSINESS PEOPLE, ADMINISTRATORS, TEACHERS, CHILDREN AND THE LIST GOES ON AND ON--CONSUMERS FROM ALL WALKS OF LIFE--COULD BECOME NOT ONLY CONSUMERS BUT, ON A LIMITED SCALE, ACCESSORS OF INFORMATION.

RECENTLY I HAD THE GOOD FORTUNE TO HEAR **THOMAS PETERS MAKE A PRESENTATION.** PETERS CO-AUTHORED **"IN SEARCH OF EXCELLENCE"**--THE BOOK WHICH EXAMINES THE BUSINESS MANAGEMENT TECHNIQUES OF TODAY'S MOST SUCCESSFUL CORPORATIONS. PETERS STATED DURING HIS SEMINAR **"MOST ACRONOYMS STINK. "NOT KISS--KEEP IT SIMPLE STUPID."** ONE OF THE KEY ATTRIBUTES OF THE EXCELLENT MANAGED COMPANIES OF TODAY IS THAT THEY REALIZED THE IMPORTANCE OF **KEEPING MANAGEMENT PHILOSOPHIES, AND PROCEDURES SIMPLE.** THE SAME CAN BE SAID FOR THE COURSE OR CURRICULUM OBJECTIVES YOU SET.

FANTASIZE FOR A MOMENT . . . FOR *EDUCATION* THE POTENTIALITY FOR THE MULTIPLE USES OF DATA BASES. THEY ARE PHENOMINAL!! THE PRICE/VALUE IS NOW PARTICULARLY APPEALING. IMAGINE USING **THE SOURCE** TO ACCESS CURRENT DOW JONES INFORMATION WHILE TEACHING A UNIT ON INVESTMENTS. THIS ELIMINATES THE TEDIOUS PROCESS OF STUDYING THE DAILY STOCK QUOTATIONS IN THE FINANCIAL SECTION.

ELECTRONIC MAIL. WITH THE ABILITY TO ELECTRONICALLY MOVE MAIL THROUGH REMOTE STORAGE CAME ALSO THE ABILITY TO MOVE MAIL BETWEEN TWO SYSTEMS; TODAY WE SEE COMPANIES OFFERING PRODUCTS LIKE **MICROCOURIER**, A TRUE DIRECT WIRE SERVICE BETWEEN TWO COMPUTERS WITH THE ABILITY TO: SCHEDULE TRANSMISSIONS; ALLOCATE THEM; POST THEM ELECTRONICALLY AND REMOTELY.

AUTOMATED BANKING. WE'VE ALL SEEN AND USED **ATM'S (AUTOMATED TELLER MACHINES).** THESE NEIGHBORHOOD , STREET-CORNER BANKS ALLOW YOU TO DROP IN YOUR CREDIT CARD, GET SOME CASH, OR MAKE A DEPOSIT. THE ADVENT OF THESE MACHINES IN THE EARLY 1980'S **BROUGHT BANKING TO THE LOCAL COMMUNITY.** BUT NOW WITH MICROS IT IS GOING MUCH FURTHER.

SPEAKING OF THE EVER-PRESENT, PLASTIC-TICKETS-TO-HAPPINESS AND GLORY--IT WAS REPORTED THAT WALTER CAVANAUGH REMAINS THE PROUD HOLDER OF MORE THAN 1100 CREDIT CARDS.

AN AD RAN IN *BYTE MAGAZINE* IN JANUARY 1981 ANNOUNCING THAT A MAJOR NYC DANK WAS OFFERING "AT HOME BANKING." IT ALLOWED PERSONAL COMPUTER-USERS TO LOG ONTO THE BANK SYSTEM USING A MODEM AND THEIR PERSONAL PHONE TO DO THEIR OWN BANKING. TWO YEARS AGO BANK AMERICA IN CALIFORNIA ANNOUNCED "AT HOME BANKING." THE PERSONAL INFORMATION AGE WAS NOW IN MOTION!!

DATA COMMUNICATIONS: THE POTENTIAL OF THIS, RELATIVELY NEW DEVELOPMENT IS MIND BOGGLING. STATED SUCCINCTLY DATACOM MEANS MOVING INFORMATION BY ELECTRICAL TRANSMISSIONS. THE TRANSMISSION OF DATA FROM POINT A TO POINT B. IT IS THE COMBINATION OF DEVELOPMENTS IN TWO FIELDS: TELECOMMUNICATIONS AND COMPUTER TECHNOLOGY.

BEFORE I REVIEW THE DECLINE IN THE COST OF EDUCATIONAL COMPUTING MRS. ROBERT A. TAFT HAS AN INTERESTING THING TO SAY OF THE TERM STATISTICS--"I ALWAYS FIND THAT STATISTICS ARE HARD TO SWALLOW AND IMPOSSIBLE TO DIGEST."

DECLINE OF COST OF EDUCATION/WORK STATION

1965-1985

1965	$20,000
1980	3,600
1981	3,000
1982	2,400
1983	2,000
1984	1,250
1985 (EST.)	1,100

STATED DIFFERENTLY--THE COMPUTER EVOLUTION CAN BE COMPARED IN PHYSICAL SIZE TO THE FOLLOWING: 18-WHEELER; PICK-UP TRUCK; AND NOW PORTABLE, 7 1/2 LBS., BRIEFCASE-SIZE, TO A TOTAL SOLUTION.

IT IS EXCITING TO ANTICIPATE A **FUTURE WITH INSTRUCTIONAL SYSTEMS** BASED ON A COMBINATION OF VIDEO AND COMPUTER TECHNOLOGIES. JUST AS TELEVISION THROUGH SESAME STREET AND THE ELECTRIC COMPANY HAS BROUGHT MAJOR EDUCATIONAL PROGRAMS INTO THE HOME, THESE TECHNOLOGIES OF THE **FUTURE WILL OFFER OTHER IMPORTANT EDUCATIONAL OPPORTUNITIES--INSTRUCTION IN ALL AREAS OF CONCERN BOTH FOR CHILDREN AS WELL AS FOR ADULTS.** ELECTRONIC MEDIA, IN TIME, WILL HAVE A DRAMATIC EFFECT ON MAIL SERVICE, NEWSPAPERS, JOURNALS, AND BOOKS. MICRO ELECTRONICS WILL BECOME A PART OF EVERYONE'S EVERYDAY LIFE--THERE IS AN INTEGRATED CIRCUIT IN YOUR FUTURE.

NOW LET'S TURN TO THE **PROFESSIONAL WORLD**

PERSONAL COMPUTERS ARE JUST BEGINNING TO MAKE AN IMPACT ON THE **BUSINESS WORLD.** IN SOME CASES USE IS DRIVEN BY SMALL SETS OF INNOVATORS IN COMPANIES. IN OTHER SITUATIONS THE PERSONAL IS SOUGHT AS AN EXECUTIVE STATUS SYMBOL.

THE TRUE QUESTION TO GRAPPLE WITH AND ANSWER IS: WILL THE ENVIRONMENT OF THE *PERSONAL COMPUTER* TURN OUT TO BE AN **AUTOMOBILE OR A CUISINART.** THE CUISINART IS AN EXPENSIVE TOOL USED BY AFFICIONADOS WHEN THEY NEED IT FOR A SPECIFIC TASK WHICH IT DOES BETTER THAN ANY OTHER TOOL IN THE KITCHEN. IT IS ALWAYS PROMINENTLY DISPLAYED, PURCHASED BY THE AFFLUENT AND

NOT PARTICULARLY ASSUMED TO BE PART OF EVERYDAY LIFE.

IT IS NOT DIFFICULT TO SEE THE ANALOGY WITH THE AUTO. TODAY IT IS AN ESSENTIAL PART OF EVERYDAY LIFE. BUT WE DIDN'T GET WHERE WE ARE WITH THE AUTO BECAUSE IT WAS ESSENTIAL WHEN IT WAS FIRST INTRODUCED. IT BECAME ESSENTIAL OVER A LONGER TIME THAN IT WILL TAKE THE PERSONAL COMPUTER TO BECOME AN ESSENTIAL ELEMENT AS A RESULT OF SOCIETY'S NEED FOR MOBILITY.

FUTURISTS INVOLVED WITH THE HARDWARE INDUSTRY NOW CAN SEE THE WRITING ON THE WALL--THE PC IS GAINING RAPID ACCEPTANCE FROM ALL MARKET AREAS.

AS THE COMMERCIAL SO APTLY STATES, "YOU'VE COME A LONG WAY BABY," WHEN LOOKING BACK TO THE FIRST PERSONAL COMPUTER--ENIAC--BUILT IN 1946 BY TWO MEN AT THE UNIV. OF PENNA. IT WAS BUILT TO MEASURE BALLISTIC PROJECTORIES FOR THE NAVY. ENIAC WEIGHED 50 TONS, TOOK UP 15,000 SQUARE FEET, COST $27,000 A DAY TO RUN AND HAD 18,000 VACUUM TUBES. THERE WAS A TEAM OF SIX MEN WHOSE SOLE JOB IT WAS JUST TO REPLACE THOSE TUBES. IT WAS LIKE PAINTING THE GOLDEN GATE BRIDGE--YOU STARTED AT ONE END REPLACING TUBES AND BY THE TIME YOU FINISHED IT WAS TIME TO START OVER AGAIN. THE REASON IT WAS THE FIRST PERSONAL COMPUTER, EVEN THOUGH IT ISN'T AS WARM, CUDDLY, AND FUZZY AS THE ONES WE KNOW TODAY, WAS BECAUSE THERE *WERE ONLY FOUR MEN* ON THE FACE OF THE EARTH WHO KNEW HOW TO OPERATE IT. IT WAS THEIR TOY--THEY MADE IT DO WHAT THEY WANTED--ONE-ON-ONE WITH THE COMPUTER.

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FOUR SURGEONS WERE TALKING ABOUT RESEARCH AND DISCUSSING WHAT

KIND OF CLIENT THEY PREFERRED TO PERFORM SURGERY ON--# 1 SAID MATH TEACHERS BECAUSE EVERY PART IS NUMBERED; #2 SAID ART TEACHERS BECAUSE EVERY PART IS COLOR-CODED; # 3 SAID SUPERVISORS BECAUSE EVERYTHING IS SATISFACTORY OR UNSATISFACTORY; # 4 SAID DP-TYPES BECAUSE THERE ARE ONLY TWO MOVING PARTS--TOP AND BOTTOM--AND THEY ARE BOTH INTERCHANGEABLE.

THEN IN 1971, A SMALL COMPANY NAMED *INTEL* FIGURED OUT A WAY TO PUT MOST OF THE CIRCUITRY WHICH MADE UP ENIAC ONTO A SMALL CHIP, WHOSE ACTIVE AREA IS PROBABLY THE SIZE OF MY SMALL FINGER NAIL. HOWEVER, IT COULD OUTCOMPUTE ENIAC BY A FACTOR OF 20. WHAT THOSE ENGINEERS FIGURED OUT WAS HOW TO PUT $200,000 WORTH OF VACUUM TUBES ON A CHIP.

YOU ALL HAVE HEARD THE PARALLELISMS--SUCH AS, IF THE REST OF THE ECONOMY HAD BEEN AS PRODUCTIVE AS EDP TECHNOLOGY A THREE BEDROOM HOUSE WOULD COST $3,500. THE PERSONAL COMPUTER HAS BROUGHT TWO ADDITIONAL PERSPECTIVES TO THE INCREASE IN PRODUCTIVITY--TIME AND SIZE. EXAMPLES--AN AROUND-THE WORLD AIRLINE TRIP WOULD TAKE 15 MINUTES AND COST $3.00, A ROLLS ROYCE WOULD GET 500 MPG BUT FIT ON THE END OF A PIN--THAT'S THE FOUR DOOR MODEL. PROFESSOR FEYNMAN (1965 NOBEL LAUREATE IN PHYSICS) DISCUSSED MICRO-MINIATURIZATION--OR HOW SMALL CAN AN OBJECT BE MADE AND STILL EXIST. IN HIS PRESENTATION HE DEMONSTRATED THE THEORETICAL POSSIBILITY OF ENCODING EVERYTHING THAT HAD BEEN WRITTEN FOR ALL RECORDED HISTORY ON ONE 5" X 8" CARD.

IT WAS THE CREATION OF PROGRAMS SUCH AS VISICALC THAT OFFICIALLY LAUNCHED PERSONAL COMPUTER INTO THE BUSINESS

MARKET BACK IN 1979. FOR THE FIRST TIME MANAGERS COULD GAIN INSIGHT INTO THE PROCESSES THEY MODELED AND COULD DO MORE COMPLETE ANALYSES THAN WERE EVER POSSIBLE BY HAND. INCREASED PRODUCTIVITY WAS NOW NOT ONLY A POSSIBILITY BUT WITHIN GRASP OF BUSINESS, EDUCATION AND ALL WALKS OF LIFE.

**"THE PERSONAL COMPUTER IS THE FIRST TOOL MAN HAS CREATED FOR IMPROVING THE PRODUCTIVITY OF INTELLECT ON AN INDIVIDUAL BASIS.

AS GEORGE BERNARD SHAW PENNED "EVERY PROFESSION IS A CONSPIRACY AGAINST THE LAYMAN." UNLIKE THE NATURAL DEVELOPMENT FROM THE WRIGHT BROTHERS PLANE TO THE BOEING 747, THE COMPUTER INDUSTRY DID THE REVERSE. WE INVENTED THE JET BEFORE THE PROPELLER. WE INITIALLY CREATED MACHINES ONLY PH.D.'S IN COMPUTER SCIENCE COULD OPERATE.

THE MESSAGE TODAY IS: THE TECHNOLOGY IS INEXPENSIVE, PORTABLE, AND *MOST IMPORTANTLY* IT'S UNDERSTANDABLE *EVEN ADMINISTRATORS* ARE RAPIDLY GAINING SOME PROFICIENCY.

A STORY IS TOLD ABOUT EINSTEIN. SOMEONE ONCE ASKED HIM HOW MANY FEET ARE IN A MILE. "I DON'T KNOW," HE SAID. "WHY SHOULD I FILL MY HEAD WITH THINGS LIKE THAT WHEN I COULD LOOK THEM UP IN ANY REFERENCE BOOK IN TWO MINUTES?" THE ABILITY TO ACCESS INFORMATION AND THEN ACT ON IT, IS WHAT GETS THINGS DONE. TODAY, AS ONE BUSINESS LEADER RECENTLY PUT IT: "I WANT PEOPLE AROUND ME WHO CAN SOLVE PROBLEMS, NOT RECITE FACTS." WE ARE IN AN AGE OF BEING OVERWHELMED WITH INFORMATION--WE NEED TO USE TECHNOLOGICAL SKILLS TO *SELECTIVELY* RECALL WHAT WE WANT

OR WE WILL BE BURIED IN USELESS RECITATION OF FACTS.

THE CHALLENGE OF INCREASING STUDENT PRODUCTIVITY IN A REALISTIC SETTING IS BECOMING A MAJOR OBJECTIVE IN ALL OF EDUCATION. CAPITALIZING ON ACCESSIBLE TECHNOLOGIES WILL BE A MAJOR CONTRIBUTOR TO ACHIEVING REALISTIC EXPERIENCE IN EDUCATION AND TRAINING.

WE HAVE ALL READ AND HEARD WHAT MANY PROGNOSTICATORS PREDICT TOMORROW WILL BRING. OUR FUTURE EFFORT MUST CONTINUE TOWARD CONTINUED EASE-OF-USE FOR FUTURE MICROCOMPUTERS.

IT HAS BEEN WITHIN THE PAST TWELVE MONTHS THAT THE COMPUTER INDUSTRY HAS PROVIDED US WITH THE TOOLS TO MAKE SUCH AN ACCEPTANCE A REALITY. THE ASTRONOMICAL IMPROVEMENTS OCCURING IN: PROCESSOR SPEEDS; RANDOM ACCESS AND PERIPHERAL MEMORY; AND SOFTWARE ARCHITECTURE AND NETWORK COMMUNICATIONS ARE MORE THAN ANY USER NEEDS TO PROCESS A SIMPLE SPREADSHEET, OR USE ANY EDUCATIONAL SOFTWARE PACKAGE.

IN ALL EDUCATIONAL CIRCLES THE FEDERAL REPORT ENTITLED "A NATION AT RISK" HAS BEEN THE FOCUS OF MUCH MEDIA COVERAGE AND DEBATE. AS VOCATIONAL BUSINESS EDUCATORS YOU CAN, WITH THE ASSISTANCE OF THE TECHNOLOGICAL AGE, REALISTICALLY PREPARE YOU STUDENTS TO COMPETE SUCCESSFULLY IN THE "REAL WORLD." IMPLEMENTING SUCH CURRICULAR COURSES OR TOPICS AS AUTOMATED ACCOUNTING, ACCESSING LARGE DATA BASES, ERGONOMICS, KEYBOARDING, WORD PROCESSING, ELECTRONIC MERGING AND FILING WILL IMPACT UPON ALL STUDENTS

LIVES. THE NATION AT RISK DESERVES MORE ATTENTION THAN MERELY IDLE CONVERSATION. IMMEDIATE ACTION MUST BE TAKEN. AS YOGI BERRA'S LAW STATES: "YOU CAN OBSERVE A LOT BY JUST WATCHING."

WE CURRENTLY MEASURE PROCESSOR SPEED IN NANOSECONDS. CONTEMPLATE THESE EXAMPLES . . . THERE ARE MORE NANOSECONDS IN ONE HOUR THAN THERE ARE HOURS THAT EVERYONE WHO HAS EVER LIVED ON EARTH HAS LIVED. IN THE POPULAR BOOK ENTITLED "THE NAKED COMPUTER." ITS AUTHORS, ROCHESTER AND GANTZ GIVE A RECIPE FOR A NANOSECOND--"TAKE A WIRE AND CUT IT 10.8" LONG. ELECTRICITY WILL TRAVEL THAT LENGTH IN ONE NANOSECOND--WHICH IS ONE BILLIONITH OF A SECOND. IF YOU TOOK A 3 FOOT STEP EVERY NONOSECOND YOU COULD CIRCUMNAVIGATE THE GLOBE 27 TIMES IN ONE SECOND. WE ARE NOW DEALING IN PECOSECONDS OF 1/1000 OF A NONOSECOND. FOR A PECOSECOND CHOP UP THE WIRE IN A PEPPER GRINDER. IT'S IMPOSSIBLE TO FATHOM THAT SPEED OR STORAGE OF 500 MEGABYTES WHICH IS ENOUGH TO STORE 27 VOLUMES OF THE ENCYCLOPEDIA BRITTANICA.

ROBERT DIAMOND, PRESIDENT OF A CONSULTING FIRM SAID, "IF THERE IS ONE FACTOR WHICH COULD CAUSE THE DRAMATIC MARCH TO THE OFFICE OF THE FUTURE TO GET OUT OF STEP, IT WOULD BE IGNORANCE OF THE DEMANDS OF ERGONOMICS--THE SCIENCE OF ADAPTING EQUIPMENT AND ENVIRONMENT TO HUMAN SKILLS AND REQUIREMENTS.

UNDERSTANDING *OFFICE RITUALS AND BEHAVIOR* IS AS IMPORTANT AS UNDERSTANDING THE TECHNOLOGY. MOST EXECUTIVES AND MANAGERS WORK IN AN ENVIRONMENT WITH CONTINUAL INTERRUPTIONS AND SCHEDULING CRISES, I.E. JUGGLING LOTS OF BALLS AT ONCE. THEY DO NOT HAVE A LOT OF TIME TO SPEND LEARNING INDIVIDUAL PIECES OF SOFTWARE. NEITHER DO YOU AS

IMPARTERS OF KNOWLEDGE AND WISDOM TO THE VOCATIONAL STUDENTS OF THE U.S.

INTEGRATION IS THE KEY WORD IN THE OFFICE OF THE FUTURE FOR ENHANCED PRODUCTIVITY. INTEGRATION AT THE: (1) USER-LEVEL--ONE WAY OF DOING THINGS, I.E. THE NATURAL WAY. (2) TASK LEVEL--ABLE TO DO MORE THAN ONE THING AT A TIME; AND (3) INFORMATION LEVEL--MIX, MATCH, CUT, AND PASTE. ERGONOMICS PLAYS A PART NOT JUST IN HARDWARE TECHNOLOGY BUT IN EDUCATIONAL SOFTWARE DEVELOPMENT. INTEGRATION AT THE USER-, TASK-, AND INFORMATION LEVEL IS A MUST FOR NEW SOFTWARE PRODUCTS BEING DEVELOPED.

RECENT FINDINGS IN EDUCATIONAL RESEARCH FROM A VARIETY OF SOURCES:

--THERE IS A MOVE AWAY FROM USING MICROS TO TEACH PROGRAMMING

--THERE IS MORE EMPHASIS ON TEACHER TRAINING & INSERVICE

--FIVE STATES PRESENTLY HAVE BILLS IN THEIR LEGISLATIVE BODIES REQUIRING COMPUTER COMPETENCE IN VARIOUS CURRICULUM AREAS

--14 OTHER STATES ARE IN THE PROCESS OF STUDYING CERTIFICATION REQUIREMENTS

--15-20% OF THE NATION'S COMPUTER-USING SCHOOLS ARE NETWORKING

--COMPUTER LABS ARE GAINING IN EDUCATIONAL POPULARITY

--EDUCATIONAL SOFTWARE IS MAKING GIGANTIC STRIDES IN IMPROVEMENTS

--INTEGRATED SOFTWARE PACKAGES WILL PLAY A MORE

DOMINANT ROLE IN THE FUTURE FOR EDUCATION

--THE CURRENT NATIONAL STUDENT/COMPUTER RATIO IS 93/1; THE OPTIMUM RATIO IS 30/1

--SMALL SCHOOLS PROVIDE THE MOST ACCESS TO COMPUTERS--25/1; LARGE SCHOOLS--100/1

--COMMERCIALLY-PREPARED EDUCATIONAL SOFTWARE IS THE MOST PEDAGOGICALLY-SOUND; YET SOME EDUCATORS FEEL THEY CAN WRITE A BETTER PACKAGE. CONSIDER THESE STATISTICS--IT TAKES 150 HOURS OF DEVELOPMENT TIME TO CREATE ONE HOUR OF COMPUTER-BASED INSTRUCTION; IF THE DOLLAR VALUE OF YOUR TIME IS CONSIDERED FOR THAT ONE HOUR--COSTS RANGE FROM $2,250 TO $7,500. THE PER HOUR AVERAGE COST OF COMMERICALLY AVAILABLE SOFTWARE IS $75 TO $100. SOME EVEN LOWER. EDUCATIONAL SOFTWARE RANGES IN COST FROM $29. *EVEN SO, SOME EDUCATORS FEEL THEY CAN WRITE A BETTER PRODUCT*

--THE NUMBER OF MICROS IN EDUCATION IS DRAMATICALLY INCREASING. 1981--18.2%, 1982--30%, 1983--68.4 %, AND 1984--92%

--CONTINUE TO EXPECT THE UNUSUAL IN MICROCOMPUTER MARKETING STRATEGIES BY BOTH HARDWARE AND SOFTWARE FIRMS. E.G. FIRMS PURCHASING ENTIRE ISSUES OF MAGAZINES, UNUSUAL, THINKING-TYPES OF TV COMMERCIALS, LARGE ADVERTISING BUDGETS AND CONSUMER-ORIENTED ADS, ONE SOFTWARE MARKETER ENLISTED A HANDFUL OF BREAK DANCERS TO DANCE AMONG SUIT-CLAD ATTENDEES AT A RECENT CONVENTION, AND ANOTHER SOFTWARE FIRM ENLISTED THE SERVICES OF A MOVIE STAR TO PUSH ONE OF ITS SOFTWARE PRODUCTS

--MOST EXPERTS SAY THAT BY 1989 40% OF ALL HOMES, 99% OF ALL SCHOOLS, AND 99% OF ALL BUSINESSES WILL HAVE PERSONAL COMPUTERS. SO FOR THOSE OF YOU WHO WANT TO STICK

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YOUR HEAD IN THE SAND AND HOPE IT WILL GO AWAY JUST KEEP IN MIND THE FATE OF THE MODEL T.

IRENE PETER HAD THIS TO SAY ABOUT CHANGE--"JUST BECAUSE EVERYTHING IS DIFFERENT DOESN'T MEAN ANYTHING HAS CHANGED."
THE ESSENTIAL CHARACTERISTIC OF INFORMATION AGE TECHNOLOGY IS *CONSTANT CHANGE.* TODAY'S *WORKPLACE IS FLUID,* AND CHANGE IS CONSTANT!!

TIME NEVER REMAINS CONSTANT. LET EACH OF US ERADICATE THE NOTION THAT THE CITIZENS OF THE U.S. ARE RAPIDLY BECOMING A NATION OF *"HAVE AND HAVE NOTS"* WHO ARE MOVING QUICKLY TOWARD BECOMING A NATION OF *"KNOW AND KNOW NOTS."* THE CHALLENGE OF STRIVING TO ATTAIN EXCELLENCE IN EDUCATION IN A TECHNOLOGICAL AGE MUST BE COMMENCED YESTERDAY. IF IT HAS NOT--START TODAY, DO NOT WAIT UNTIL TOMORROW. THE FUTURE DOES NOT BEGIN TODAY. THE FUTURE IS NOW!!

IN CLOSING, I WOULD SAY THAT THE TYPE OF COMPUTING DEVICES WE WILL ALL NEED REFLECTS A COMMENT BY ALBERT EINSTEIN WHO SAID *"ALL TRULY GREAT THINGS ARE SIMPLE"* OR AS STATED BY ONE OF THE CO-FOUNDERS OF APPLE, *"NEVER TRUST A COMPUTER YOU CAN'T LIFT!"*

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